



MICROCHIP

MIC7400/1
Programming Board
User's Guide

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

**QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
= ISO/TS 16949 =**

Trademarks

The Microchip name and logo, the Microchip logo, AnyRate, dsPIC, FlashFlex, flexPWR, Heldo, JukeBlox, KeeLoq, KeeLoq logo, Klear, LANCheck, LINK MD, MediaLB, MOST, MOST logo, MPLAB, OptoLyzer, PIC, PICSTART, PIC32 logo, RightTouch, SpyNIC, SST, SST Logo, SuperFlash and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

ClockWorks, The Embedded Control Solutions Company, ETHERSYNCH, Hyper Speed Control, HyperLight Load, IntelliMOS, mTouch, Precision Edge, and QUIET-WIRE are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, EtherGREEN, In-Circuit Serial Programming, ICSP, Inter-Chip Connectivity, JitterBlocker, KlearNet, KlearNet logo, MiWi, motorBench, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICKit, PICTail, PureSilicon, RightTouch logo, REAL ICE, Ripple Blocker, Serial Quad I/O, SQL, SuperSwitcher, SuperSwitcher II, Total Endurance, TSHARC, USBCheck, VariSense, ViewSpan, WiperLock, Wireless DNA, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

GestIC is a registered trademarks of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2017, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

ISBN: 978-1-5224-2168-9

Object of Declaration: MIC7400/1 Programming Board User's Guide

EU Declaration of Conformity

This declaration of conformity is issued by the manufacturer.

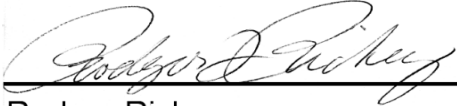
The development/evaluation tool is designed to be used for research and development in a laboratory environment. This development/evaluation tool is not a Finished Appliance, nor is it intended for incorporation into Finished Appliances that are made commercially available as single functional units to end users under EU EMC Directive 2004/108/EC and as supported by the European Commission's Guide for the EMC Directive 2004/108/EC (8th February 2010).

This development/evaluation tool complies with EU RoHS2 Directive 2011/65/EU.

This development/evaluation tool, when incorporating wireless and radio-telecom functionality, is in compliance with the essential requirement and other relevant provisions of the R&TTE Directive 1999/5/EC and the FCC rules as stated in the declaration of conformity provided in the module datasheet and the module product page available at www.microchip.com.

For information regarding the exclusive, limited warranties applicable to Microchip products, please see Microchip's standard terms and conditions of sale, which are printed on our sales documentation and available at www.microchip.com.

Signed for and on behalf of Microchip Technology Inc. at Chandler, Arizona, USA.



Rodger Richey
Director of Development Tools



Date

NOTES:

Table of Contents

Preface	6
Chapter 1. Product Overview	
1.1 Introduction	10
1.2 MIC7400/1 Programming Board Short Overview	10
1.3 MIC7400/1 Programming Board Key Features	10
1.4 What is the MIC7400/1 Programming Board?	10
1.5 What does the MIC7400/1 Programming Board kit include?	11
Chapter 2. Installation and Operation	
2.1 Introduction	12
2.2 MIC7400/1 Programming Board – Overview	12
2.3 MIC7400/1 Programming Board Connectors	13
2.4 Using the MIC7400/1 Programming Board	14
2.5 Typical Usage Examples	16
Appendix A. Schematic and Layouts	
A.1 Introduction	20
A.2 Board – Schematic	21
A.3 Board – Top Silk	22
A.4 Board – Top Copper and Silk	22
A.5 Board – Top Copper	23
A.6 Board – Bottom Copper	23
A.7 Board – Bottom Copper and Silk	24
A.8 Board – Bottom Silk	24
Appendix B. Bill of Materials (BOM)	
Worldwide Sales and Service	28

MIC7400/1 Programming Board User's Guide

NOTES:

Preface

NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our website (www.microchip.com) to obtain the latest documentation available.

Documents are identified with a “DS” number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is “DSXXXXXXXXA”, where “XXXXXXXX” is the document number and “A” is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE online help. Select the Help menu, and then Topics, to open a list of available online help files.

INTRODUCTION

This chapter contains general information that will be useful to know before using the MIC7400/1 Programming Board. Items discussed in this chapter include:

- [Document Layout](#)
- [Conventions Used in this Guide](#)
-
- [Recommended Reading](#)
- [The Microchip Web Site](#)
- [Customer Support](#)
- [Document Revision History](#)

DOCUMENT LAYOUT

This document describes how to use the MIC7400/1 Programming Board as a development tool to emulate and debug firmware on a target board. The manual layout is as follows:

- **Chapter 1. “Product Overview”** – Important information about the MIC7400/1 Programming Board.
- **Chapter 2. “Installation and Operation”** – Provides a detailed overview of the MIC7400/1 Programming Board main hardware components and connectors; includes an in-depth account of the MIC7400/1 Programming Board modes of operation, and the board’s typical usage scenarios.
- **Appendix A. “Schematic and Layouts”** – Shows the schematic and layout diagrams for the MIC7400/1 Programming Board.
- **Appendix B. “Bill of Materials (BOM)”** – Lists the parts used to build the MIC7400/1 Programming Board.

MIC7400/1 Programming Board User's Guide

CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
Italic characters	Referenced books	<i>MPLAB® IDE User's Guide</i>
	Emphasized text	...is the <i>only</i> compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, italic text with right angle bracket	A menu path	<u><i>File</i></u> >Save
Bold characters	A dialog button	Click OK
	A tab	Click the Power tab
N'Rnnnn	A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.	4'b0010, 2'hF1
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
Courier New font:		
Plain Courier New	Sample source code	#define START
	Filenames	autoexec.bat
	File paths	c:\mcc18\h
	Keywords	_asm, _endasm, static
	Command-line options	-Opa+, -Opa-
	Bit values	0, 1
	Constants	0xFF, 'A'
Italic Courier New	A variable argument	<i>file.o</i> , where <i>file</i> can be any valid filename
Square brackets []	Optional arguments	mcc18 [options] <i>file</i> [options]
Curly brackets and pipe character: { }	Choice of mutually exclusive arguments; an OR selection	errorlevel {0 1}
Ellipses...	Replaces repeated text	var_name [, var_name...]
	Represents code supplied by user	void main (void) { ... }

RECOMMENDED READING

This user's guide describes how to use the MIC7400/1 Programming Board. Other useful documents are listed below. The following Microchip documents are available and recommended as a supplemental reference resource:

- **MIC7400 Data Sheet, Revision 1.0**
- **MIC7401 Data Sheet, Revision 1.0**
- **MIC7400 Evaluation Board User's Guide, Revision 1.0**
- **MIC7401 Evaluation Board User's Guide, Revision 1.0**

THE MICROCHIP WEB SITE

Microchip provides online support via our web site at www.microchip.com. This website is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

PRODUCT CHANGE NOTIFICATION SERVICE

Microchip's customer notification service helps keep customers current on Microchip products. Subscribers will receive e-mail notifications whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, access the Microchip website at www.microchip.com, click on **Product Change Notification** and follow the registration instructions.

CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at:
<http://www.microchip.com/support>.

DOCUMENT REVISION HISTORY

Revision A (September 2017)

- Initial Release of this Document.

Chapter 1. Product Overview

1.1 INTRODUCTION

This chapter provides an overview of the MIC7400/1 Programming Board and covers the following topics:

- MIC7400/1 Programming Board Short Overview
- MIC7400/1 Programming Board Key Features
- What Is the MIC7400/1 Programming Board?
- What Does the MIC7400/1 Programming Board kit Include?

1.2 MIC7400/1 PROGRAMMING BOARD SHORT OVERVIEW

The MIC7400/1 Programming Board is designed to demonstrate the MIC7400/1 Power Management IC (PMIC) when programmed by a microcontroller, using an easy-to-understand interface. The board offers increased functionality by the addition of an on-board EEPROM and allows the user to copy, store and also reprogram all the registers in the MIC7400/1 devices.

1.3 MIC7400/1 PROGRAMMING BOARD KEY FEATURES

The MIC7400/1 Programming Board has the following features:

- Power options: stand-alone battery powered by one-coin cell (CR2032), USB or external 5V source
- On-board EEPROM(2K) for MIC7400/1's parameters backup and reprogramming
- 8 modes of operation for extensive functionality
- Power-Good live LED indicators for all 6 outputs
- LCD screen with intuitive text for an easy-to-use experience
- MIC7400/1 device cloning when interfaced with the MIC7400/1 GUI, using the MIC2221 integrated on the MIC7400 and MIC7401 Evaluation Boards.

1.4 WHAT IS THE MIC7400/1 PROGRAMMING BOARD?

The MIC7400/1 Programming Board is used to demonstrate the Microchip Technology, Inc., MIC7400/1 PMIC on-the-fly programmability by a microcontroller. The MIC7400/1 Programming Board is used to:

- copy and store the content of the MIC7400/1's internal EEPROM into the on-board EEPROM
- program a new MIC7400/1 with the stored configuration
- modify the output voltages and current limits for both Normal and Stand-by modes
- program the regulators outputs start-up sequence and the delay between them.

The LCD interface is user friendly and intuitive, with all the information needed being provided on the screen. A rotary switch is used to change modes of operation.

MIC7400/1 Programming Board User's Guide

1.5 WHAT DOES THE MIC7400/1 PROGRAMMING BOARD KIT INCLUDE?

The MIC7400/1 Programming Board kit includes the following items:

- MIC7400/1 Programming Board (ADM00760)
- Important Information Sheet

Chapter 2. Installation and Operation

2.1 INTRODUCTION

This chapter details the components, setup and utilization of the MIC7400/1 Programming Board.

2.2 MIC7400/1 PROGRAMMING BOARD – OVERVIEW

The main components of the MIC7400/1 Programming Board are:

- Battery ON/OFF switch - used to turn on the MIC7400/1 Programming Board while being powered by the on-board coin-cell battery
- PIC16F1509 - the main controller of the MIC7400/1 Programming Board that communicates with the MIC7400/1 and the LCD display, as well as interfacing with other on-board hardware peripherals, such as the LED indicators, switches and potentiometers
- LCD display - shows information relevant to the mode selected, depending on the action taken by means of the **Select** switch
- PG1 to PG 6 LEDs used to indicate if the MIC7400/1 output voltages are above 91% of the target value. This information is read from the MIC7400/1 Power-Good Register (00'h)
- **Select** switch - used to select the desired mode of operation
- **Voltage** and **Current** potentiometers used for selecting:
 - voltage and current, while in modes 1-6
 - channel and sequence (with SEL set to NORM), or sequence delay (with SEL set to STBY), while in mode 7
- **READ** button:
 - used to copy the MIC7400/1 internal EEPROM into the on-board EEPROM, while in mode 0
 - switching operating states, from Normal to Standby and vice-versa, while in modes 1-6
- **WRITE** button:
 - used to copy the content of the on-board EEPROM into the MIC7400/1 internal EEPROM, while in mode 0 (registers 02'h - 23'h)
 - in modes 1-6: used to write the selected voltage to the MIC7400/1 volatile memory and the on-board EEPROM
 - in mode 7: used to save the channel and start-up delay to the MIC7400/1 volatile memory and the internal EEPROM
- **SEL** switch:
 - used to select between Normal and Standby operation while writing the desired voltages and currents, in modes 1-6
 - used to select between changing the channel sequence and sequence delay, in mode 7
- 2 Kbit of EEPROM for easy copy, back-up and restore of the MIC7400/1 internal registers
- an on-board battery (CR2032) for stand-alone usage. The MCP1624 Boost

MIC7400/1 Programming Board User's Guide

Converter is used to create a regulated 5V supply for MIC7400/1 Programming Board. It boosts the coin-cell voltage (3V nominal) to the 5V needed by the LCD, EEPROM and the microcontroller. This voltage is also available on the J2 (if a jumper is placed on J7) connector (see [Figure 2-2](#)).

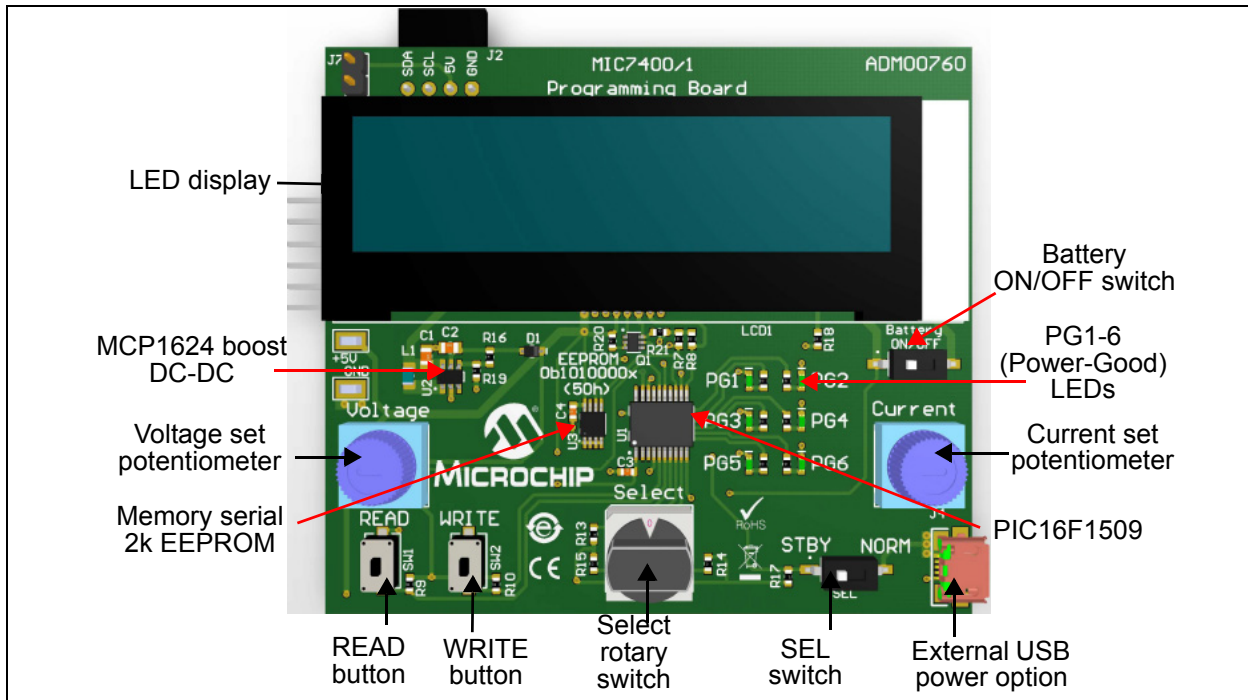


FIGURE 2-1: MIC7400/1 Programming Board Top View – Main Hardware Components.

There are four options of powering up the MIC7400/1 Programming Board:

- the on-board coin cell with the MCP1624 boost converter
- the USB power supply via a micro USB connector
- external power supply (requires 5V stable power supply)
- J2 header (by connecting a jumper to J7)

2.3 MIC7400/1 PROGRAMMING BOARD CONNECTORS

The MIC7400/1 Programming Board comes equipped with a standard 2.54 mm male connector for easy interfacing with the MIC7400/1 Evaluation Boards (ADM00811 and ADM00812). In order to enable communication with the MIC7400/1 GUI, the Programming Board must be connected to the MIC7400/1 Evaluation Board (using J2) and the Evaluation Board must be connected to a PC via USB.

To be recognized by the MIC7400/1 GUI, the on-board EEPROM must first be initialized (by reading any MIC7400/1 device).

NOTICE

In order to prevent conflict on the I2C bus, the Select switch must be moved to position 0 before connecting the MIC7400/1 Evaluation Boards.

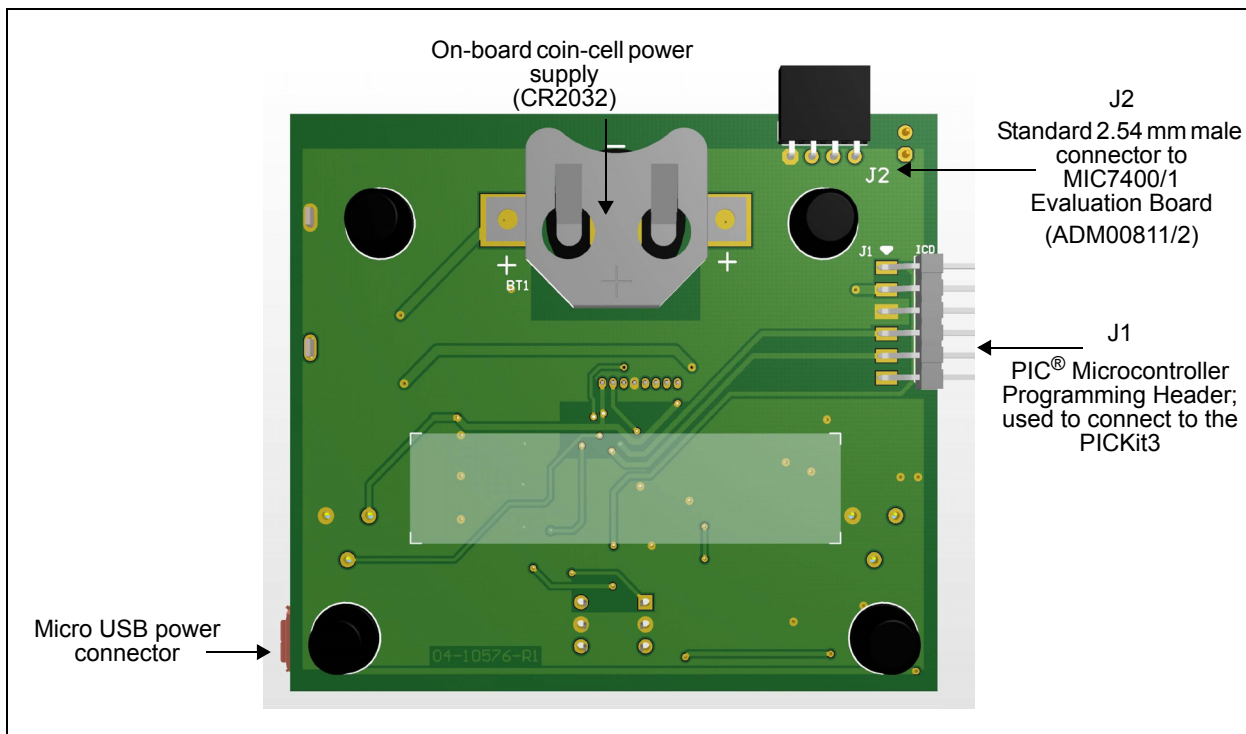


FIGURE 2-2: MIC7400/1 Programming Board Bottom View – Connectors.

2.4 USING THE MIC7400/1 PROGRAMMING BOARD

2.4.1 Powering and interfacing with the MIC7400/1 Programming Board

The MIC7400/1 Programming Board can be connected to any I²C interface that has a MIC7400/1 connected. Great care must be taken when connecting to a complex I²C system so that the MIC7400/1 Programming Board is the only MASTER active, otherwise false readings and writings may occur due to a conflict on the I²C bus.

After power is applied to the MIC7400/1 Programming Board and to the attached device, the MIC7400/1 Programming Board can be turned on by switching ON the **Battery ON/OFF** switch (while being powered by the coin cell) or by switching on the external power supply.

2.4.2 Modes of Operation

The MIC7400/1 Programming Board software is structured around the **Select** rotary switch whose position determines the operating mode of the MIC7400/1 Programming Board and the functionality of the buttons and switches.

There are eight possible modes of operation. They are determined by the position of the **Select** rotary switch, as described in [Sections 2.4.2.1](#) through 2.4.2.4.

2.4.2.1 POSITION 0

In this position, the I²C bus is active only for a few milliseconds while the welcome screen (“MICROCHIP MIC7400/1”) is displayed; after a few milliseconds, the activity on the I²C bus stops.

MIC7400/1 Programming Board User's Guide

Note: The integrated MCP2221 on the MIC7400/1 Evaluation Board can only be used while the MIC7400/1 Programming Board is in this mode, so there is no conflict between the microcontroller and the MCP2221. While using the MCP2221 (using the GUI to program the on-board EEPROM), pressing the **READ** or **WRITE** buttons is not advised.

In order to read the on-board EEPROM, the device address in the MIC7400/1 GUI must be changed to 0b1010000x (50h).

When not using the MIC2221 integrated on the MIC7400/1 Evaluation Board, the **READ** button can be used to read the content of the MIC7400/1 internal EEPROM and copy it to the on-board EEPROM. The PG 1-6 LEDs will light up in sequence to signal the start of the reading process and a "Reading..." message will be displayed on the LCD screen. If the action is successful, a message ("DONE") will briefly be displayed on the screen and the I²C activity will stop.

When not using the MIC2221 integrated on the MIC7400/1 Evaluation Board, the **WRITE** button can be used to write the content of the on-board EEPROM to the MIC7400/1 internal EEPROM. The PG 1-6 LEDs will light up in sequence to signal the start of the writing process and a "Writing..." message will appear on the LCD screen. If the action is successful, the message "DONE" will briefly be displayed on the screen and the I²C activity will stop.

If a read/write action cannot be started, due to an error on the I²C bus or to the MIC7400/1 not responding, an "ERROR" message will appear on the screen and all PG1-6 LEDs will flash five times, after which the I²C bus activity stops.

If a read/write action is started but cannot be completed, an "Action not comp." message will be displayed on the screen and all PG 1 – 6 LEDs will flash five times, after which the I²C bus activity stops.

2.4.2.2 POSITIONS 1-6

In this mode, the **Voltage** and **Current** potentiometers can be used to set the voltage and the current limit of the selected regulator. Mode selection is done by means of the **SEL** switch, which enables writing to either the Standby (**STBY**) or Normal (**NORM**) mode of operation. Using the **Read** button, the current mode of operation for the attached MIC7400/1 can be changed.

After the desired voltage and current limit have been selected, press the **WRITE** button to write the new values to the MIC7400/1 temporary register and to the on-board EEPROM. These values will not be saved directly into the internal EEPROM of the MIC7400/1 and can be canceled by performing a power-down/power-up sequence. To save the newly-input values into the MIC7400/1 internal EEPROM, the **Select** switch must be changed to position 0 and the **WRITE** button must be pressed.

2.4.2.3 POSITION 7

This mode is used to assign each selected converter to the selected sequence and the delay between sequences.

When the **SEL** switch is set to **NORM**:

- the channel (buck or boost) can be selected with the **Voltage** potentiometer
- the sequence can be selected with the **Current** potentiometer

Once the desired channel and sequence have been selected, press the **WRITE** button to send the new configuration to the MIC7400/1 and to the on-board EEPROM. Flashing the PG LEDs 2 times confirms that the write action has been completed successfully.

Switching **SEL** to STBY selects the sequence delay from 0 ms to 7 ms, by using the **Current** potentiometer. The configuration can be saved by pressing the **WRITE** button. Flashing the PG LEDs 2 times confirms that the write action has been completed successfully.

2.4.2.4 PG 1-6 (Power-Good) Status LEDs

The MIC7400/1 Programming Board is equipped with six green LEDs used to indicate the Power-Good status of the MIC7400/1 converters. These LEDs use the internal Power Good Register (00h) to determine the status of all six converters and work only when the board is in mode 1-7 (in mode 0 there is no activity on the I²C bus).

2.5 TYPICAL USAGE EXAMPLES

2.5.1 Configure Device Settings and Upload Them to the MIC7400/1 EEPROM

Configuring the device settings by means of the **Voltage** and **Current** potentiometers is the most basic functionality of the MIC7400/1 Programming Board. Next are the steps necessary for configuring:

- connect the MIC7400/1 Programming Board to the desired MIC7400/1 via J2 connector (refer to [Figure 2-2](#))
- power the MIC7400/1 Programming Board and the desired MIC7400/1
- bring the **Select** switch to position 0
- press the **READ** button to copy the MIC7400/1 registers to the MIC7400/1 Programming Board's EEPROM. The successful completion of the action is confirmed by a "DONE" message displayed on the screen (refer to [Section 2.4.2.1 "Position 0"](#)). This action is necessary in order to maintain the register values that are not modified by the board
- choose the desired channel by rotating the **Select** switch to a position that ranges from 1 to 6
- with the desired channel selected, choose the mode of operation (Stand-by or Normal) to which the configuration should be saved, by using the **SEL** switch
- use the **Voltage** and **Current** potentiometers to select the desired output voltage and current limit, respectively
- press the **WRITE** button to save the new configuration to the MIC7400/1 temporary memory and the on-board EEPROM.
- to copy the on-board EEPROM into the permanent MIC7400/1 internal EEPROM:
 - the **Select** switch must be changed to position 0
 - the **WRITE** button must be pressed

At any point, if the MIC7400/1 is powered down or reset, all settings in the temporary memory will be lost, but these will still be present in the on-board EEPROM, so that a write cycle to MIC7400/1 will restore and save them.

Note that regardless if the MIC7400/1 is connected to the MIC7400/1 Programming Board or not, the on-board EEPROM will still be written to.

2.5.2 Copy the Settings from the MIC7400/1 GUI to the MIC7400/1 Programming Board, Then Upload Them to Any MIC7400/1 EEPROM

If the MIC7400/1 configurations have already been done and saved using the MIC7400/1 GUI, the user can save all the registers to the MIC7400/1 Programming Board's EEPROM and then program other MIC7400/1 devices without the help of the MIC7400/1 GUI.

MIC7400/1 Programming Board User's Guide

2.5.2.1 MIC7400/1 GUI SETTINGS TO THE MIC7400/1 PROGRAMMING BOARD EEPROM

To copy the MIC7400/1 GUI configurations to the MIC7400/1 Programming Board, this sequence must be used:

- if the MIC7400/1 Programming Board was previously used to read the registers of a MIC7400/1, these steps will be optional; otherwise, the board must first be initialized (by reading a MIC7400/1):
 - connect a MIC7400/1 to the MIC7400/1 Programming Board via J2 connector (refer to [Figure 2-2](#)).
 - power the desired MIC7400/1 and the MIC7400/1 Programming Board
 - bring the **Select** switch to position 0
 - press the **READ** button. The successful completion of the action is confirmed by a "DONE" message displayed on the screen. Refer to **Section 2.4.2.1 "Position 0"**
- connect any MIC7400/1 Evaluation Board by using the standard 2.54 mm female header situated on the board's top left corner (J2) and power the MIC7400/1 Programming Board
- rotate the **Select** switch to position 0
- connect the MIC7400/1 Evaluation Board to the GUI by using a USB cable
- start the MIC7400/1 GUI
- select the desired configuration
- in the MIC7400/1 GUI, click the **ScanAddr** button. In the **Addr** box, two devices should be detected: the MIC7400/1 PMIC (address 0x30, if powered) and the MIC7400/1 Programming Board on-board EEPROM (address: 0x50). Select the 0x50 address and press **Connect** button.
- go to the **OPERATION** section and click the **WriteAll** button. For additional information, refer to the MIC7400/MIC7401 Evaluation Board User's Guide

2.5.2.2 MIC7400/1 PROGRAMMING BOARD SETTINGS TO ANY MIC7400/1 DEVICE

To upload the MIC7400/1 Programming Board configurations to any MIC7400/1 device, the following steps must be taken:

- connect a MIC7400/1 device to the MIC7400/1 Programming Board via J2 connector (refer to [Figure 2-2](#))
- power the MIC7400/1 and the MIC7400/1 Programming Board
- bring the **Select** switch to position 0
- press the **WRITE** button; the successful completion of the action is confirmed by a "DONE" message. Refer to **Section 2.4.2.1 "Position 0"** for more information

2.5.3 Copy the Configuration across Multiple MIC7400/1 Devices; Export the Configuration to the MIC7400/1 GUI

The MIC7400/1 Programming Board can be used to copy the configuration of a MIC7400/1 device to another MIC7400/1 device, as well as, export the register values written in the board's EEPROM to the MIC7400/1 GUI.

2.5.3.1 MIC7400/1 DEVICE TO MIC7400/1 DEVICE

To copy the configuration of a MIC7400/1 to another MIC7400/1, this sequence must be applied:

- connect the MIC7400/1 with the desired settings to the MIC7400/1 Programming Board via J2 connector
- power both the desired MIC7400/1 and the MIC7400/1 Programming Board
- rotate the **Select** switch to position 0
- press the **READ** button; the successful completion of the action is confirmed by a “DONE” message. See **Section 2.4.2.1 “Position 0”**
- disconnect the MIC7400/1 Programming Board and reconnect it to the MIC7400/1 that the configuration needs to be transferred to
- power both the successive MIC7400/1 and the MIC7400/1 Programming Board
- make sure the board **Select** switch is in position 0
- press the **WRITE** button; a “DONE” message confirms that the action was successfully completed. See **Section 2.4.2.1 “Position 0”**

2.5.3.2 MIC7400/1 PROGRAMMING BOARD EEPROM TO MIC7400/1 GUI

To export the settings from the MIC7400/1 Programming Board to the MIC7400/1 GUI, the following sequence must be applied:

- connect any MIC7400/1 Evaluation Board to the MIC7400/1 Programming Board using the standard 2.54 mm female header situated on the boards top left corner (J2)
- bring the **Select** switch to position 0
- connect the MIC7400/1 Evaluation Board to the GUI using a USB cable
- power the MIC7400/1 Programming Board and start the MIC7400/1 GUI
- click the **ScanAddr** button. In the **Addr** box, two devices should be detected: the MIC7400/1 PMIC (address 0x30, if powered) and the MIC7400/1 Programming Board on-board EEPROM (address: 0x50). Select the 0x50 address and press **Connect** button.
- go to the **OPERATION** section tab and click the **ReadAll** button to read the configurations

2.5.4 Setting the Start-Up Sequence and Saving It to the MIC7400/1 EEPROM

This feature of the MIC7400/1 Programming Board allows the MIC7400/1 regulators to start in a predefined sequence and with a preset delay between them, necessary for the new generation of microprocessors and FPGAs.

These are the steps necessary for configuring the start-up sequence:

- connect the MIC7400/1 Programming Board to a MIC7400/1
- power both the MIC7400/1 Programming Board and the device connected to it
- bring the **Select** switch to position 7
- set the **SEL** switch to NORM
- use the **Voltage** potentiometer to select the desired channel (channels 1-5 for buck converters, and channel 6 for boost converter) and the **Current** potentiometer for selecting the desired place in the start-up sequence
- press the **WRITE** button to transfer the new data to the MIC7400/1 volatile memory and to the on-board EEPROM
- after the desired sequence has been set, move the **SEL** switch to STBY
- set the sequence delay by using the **Current** potentiometer. The sequence delay can be set between 0 and 7 ms. The display will show the newly set delay together with the previous delay set in the MIC7400/1

MIC7400/1 Programming Board User's Guide

- press the **WRITE** button to memorize the new delay
- to make the new configuration permanent, rotate the **Select** switch to position 0 and press the **WRITE** button

Note: Note that pressing the **WRITE** button will permanently save the on-board EEPROM into the MIC7400/1 internal EEPROM.

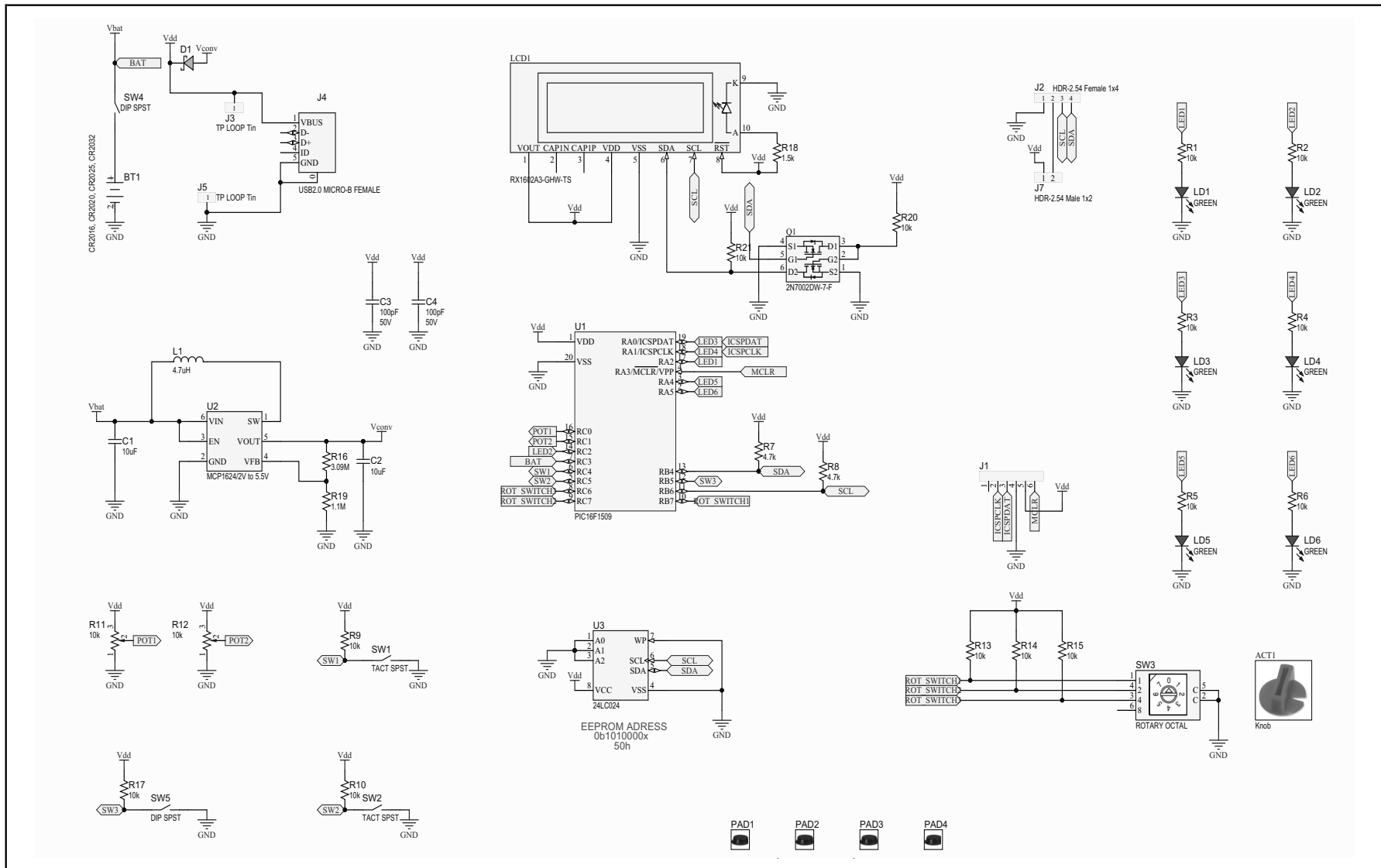
Appendix A. Schematic and Layouts

A.1 INTRODUCTION

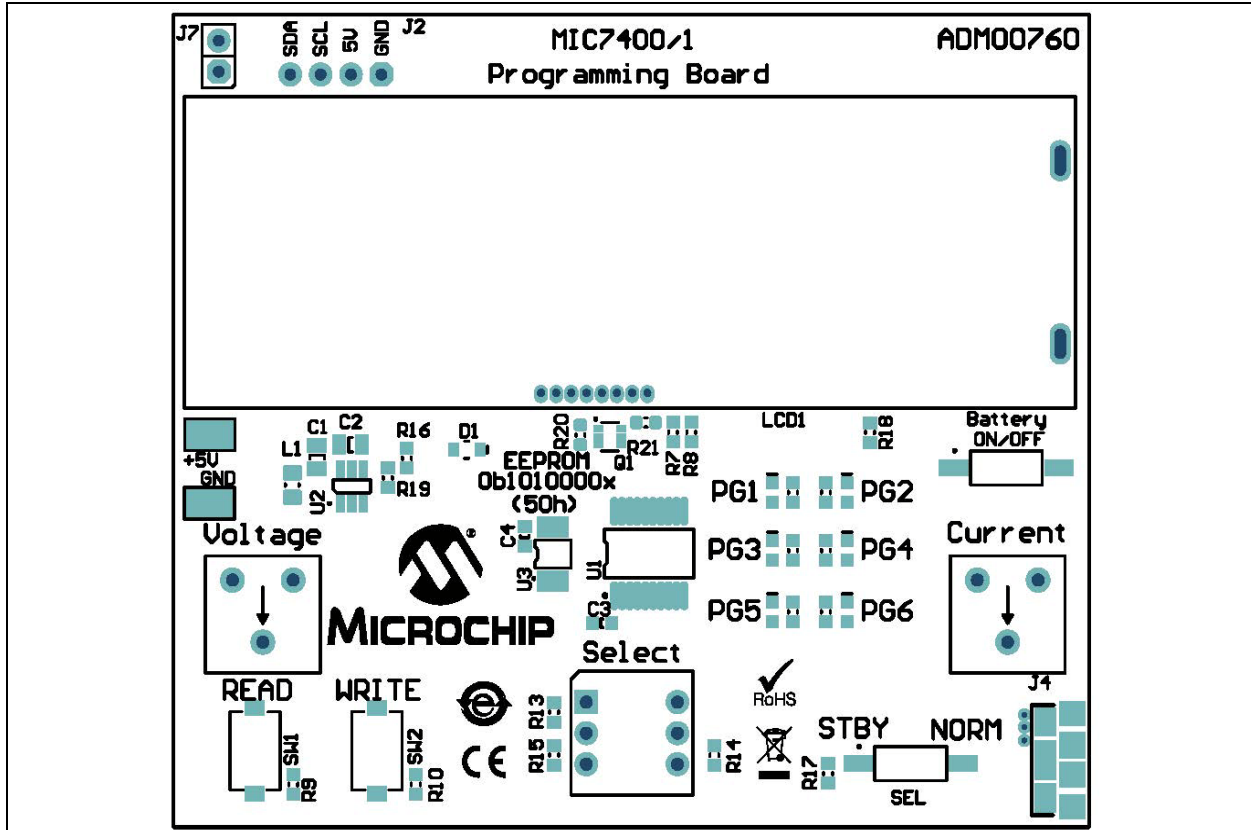
This appendix contains the following schematics and layouts for the MIC7400/1 Programming Board (ADM00760):

- Board – Schematic
- Board – Top Silk
- Board – Top Copper and Silk
- Board – Top Copper
- Board – Bottom Copper
- Board – Bottom Copper and Silk
- Board – Bottom Silk

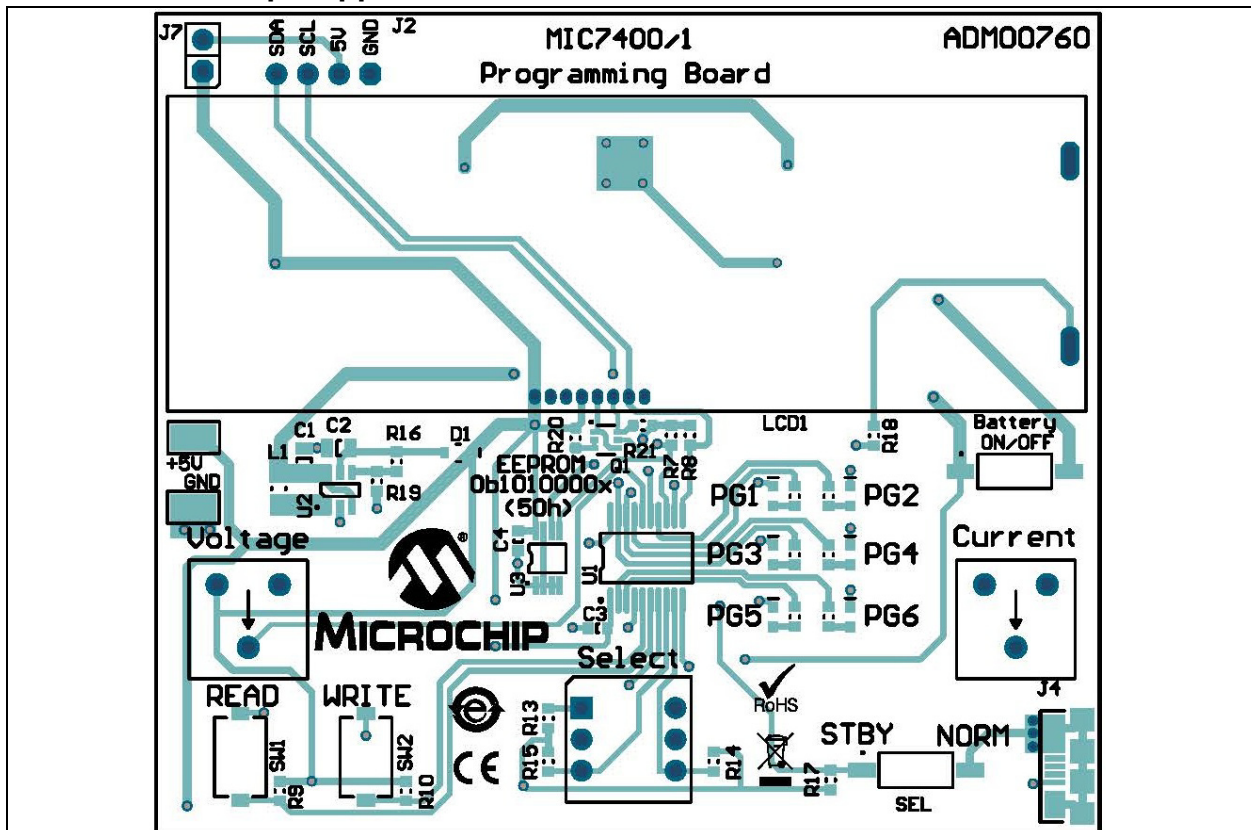
A.2 BOARD – SCHEMATIC



A.3 Board – Top Silk

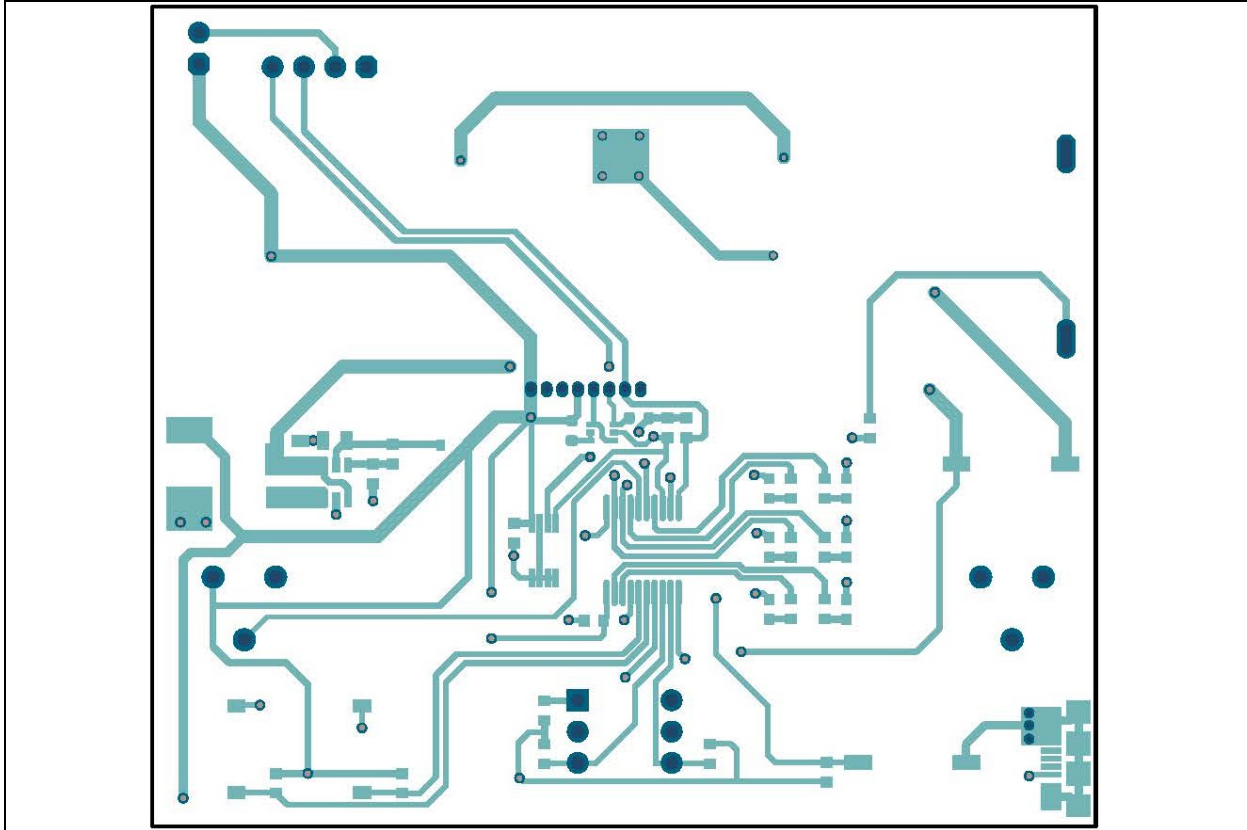


A.4 Board – Top Copper and Silk

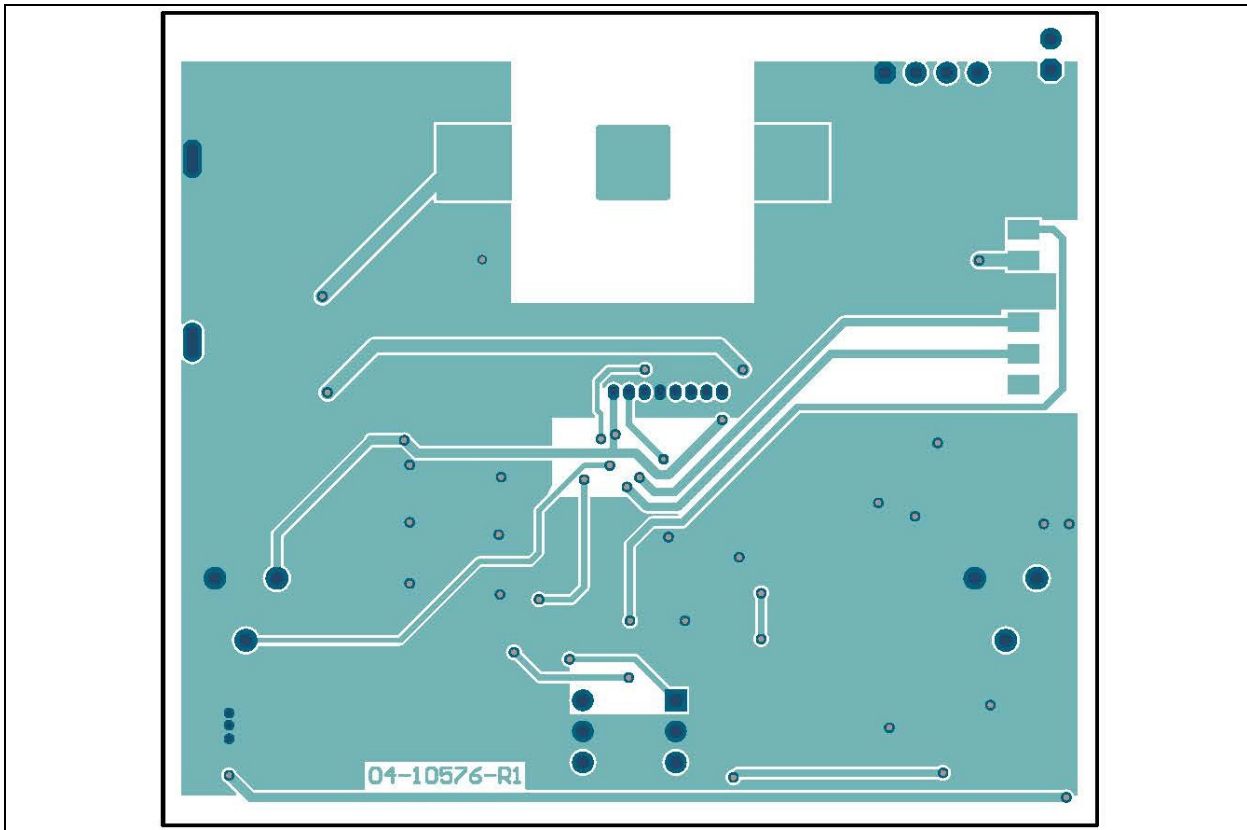


MIC7400/1 Programming Board User's Guide

A.5 Board – Top Copper



A.6 Board – Bottom Copper



MIC7400/1 Programming Board User's Guide

NOTES:

Appendix B. Bill of Materials (BOM)

TABLE B-1:

Qty.	Reference	Description	Manufacturer	Part Number
1	ACT1	MECH HW KNOB WE-714287050 BLUE	Würth Elektronik	714287050
1	BT1	BATT HOLDER Retainer SMD CR2016, CR2020, CR2025, CR2032	Keystone Electronics Corp.	3002TR
2	C1, C2	CAP CER 10uF 25V 10% X5R SMD 0805	TDK Corporation	C2012X5R1C106M/0.85
2	C3, C4	CAP CER 100pF 50V 1% C0G SMD 0603	TDK Corporation	C1608C0G1H101F
1	D1	DIO SCKTY B0520WS 430mV 500mA 20V SOD-323	Diodes Incorporated®	B0520WS-7-F
1	J1	CON HDR-2.54 Male 1x6 Gold 5.84MH SMD R/A	Sullins Connector Solutions	GBC06SBSN-M89
1	J2	CON HDR-2.54 Female 1x4 Gold TH R/A	Samtec, Inc.	SSW-104-02-G-S-RA
2	J3, J5	CON TP LOOP Tin SMD	Harwin Plc.	S1751-46R
1	J4	CON USB2.0 MICRO-B FEMALE SMD R/A	FCI	10118192-0001LF
1	J7	CON HDR-2.54 Male 1x2 Tin 6.10MH TH VERT	Molex®	0022284020
1	L1	INDUCTOR 4.7uH 230mOhm 20% 0805	Taiyo Yuden Co., Ltd.	587-2773-1-ND
1	LCD1	DISPLAY LCD RX1602A3-GHW-TS 16x2 Alpha 3V-5V TH	Midas, Inc	MCCOG21605C6W-SPTLYI
6	LD1, LD2, LD3, LD4, LD5, LD6	DIO LED GREEN 2V 30mA 35mcd Clear SMD 0603	Lite-On®, Inc.	LTST-C191KGKT
4	PAD1, PAD2, PAD3, PAD4	MECH HW RUBBER PAD CYLINDRICAL D7.9 H5.3 BLACK	3M	SJ61A11
1	Q1	TRANS FET DUAL N-CH 2N7002DW-7-F 60V 230mA 310mW SOT-363	Diodes Incorporated®	2N7002DW-7-F
1	PCB1	MIC7400/1 Programming Board - Printed Circuit Board	—	04-10576-R1
14	R1, R2, R3, R4, R5, R6, R9, R10, R13, R14, R15, R17, R20, R21	RES TKF 10k 5% 1/10W SMD 0603	Panasonic® - ESG	ERJ-3GEYJ103V
2	R7, R8	RES TF 4.7k 0.5% 1/10W SMD 0603	Yageo Corporation	RT0603DRD074K7L

Note 1: The components listed in this Bill of Materials are representative of the PCB assembly. The released BOM used in manufacturing uses all RoHS-compliant components.

MIC7400/1 Programming Board User's Guide

TABLE B-1: (CONTINUED)

Qty.	Reference	Description	Manufacturer	Part Number
2	R11, R12	RES TRIMMER Cermet 10k 10% 500mW TH 3386F	Bourns®, Inc.	3386F-1-103TLF
1	R16	RES TKF 3.09M 1% 1/10W SMD 0603	Vishay/Dale	CRCW06033M09FKEA
1	R19	RES TKF 1.1M 1% 1/10W SMD 0603	Vishay/Dale	CRCW06031M10FKEA
2	SW1, SW2	SWITCH TACT SPST 24V 50mA KSR231GLFS SMD 6X3.5mm	TE Connectivity Alcoswitch	147873-2
1	SW3	SWITCH ROTARY Octal 24V 150mA 428527520908 TH	Würth Elektronik	428527520908
2	SW4, SW5	SWITCH DIP SPST 24V 25mA 418121270801 SMD	OMRON Corporation	A6S-1104-H
1	U1	MCHP MCU 8-BIT 20MHz 14kB 512B PIC16F1509-I/SS SSOP-20	Microchip Technology, Inc.	PIC16F1509T-I/SS
1	U2	MCHP ANALOG SWITCHER Boost 2V to 5.5V MCP1624T-I/CHY SOT-23-6	Microchip Technology, Inc.	MCP1624T-I/CHY
1	U3	MCHP MEMORY SERIAL EEPROM 2k I2C 24LC024T-E/MS MSOP-8	Microchip Technology, Inc.	24LC024T-E/MS

Note 1: The components listed in this Bill of Materials are representative of the PCB assembly. The released BOM used in manufacturing uses all RoHS-compliant components.



MICROCHIP

Worldwide Sales and Service

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
<http://www.microchip.com/support>
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Austin, TX
Tel: 512-257-3370

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Novi, MI
Tel: 248-848-4000

Houston, TX
Tel: 281-894-5983

Indianapolis
Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453
Tel: 317-536-2380

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608
Tel: 951-273-7800

Raleigh, NC
Tel: 919-844-7510

New York, NY
Tel: 631-435-6000

San Jose, CA
Tel: 408-735-9110
Tel: 408-436-4270

Canada - Toronto
Tel: 905-695-1980
Fax: 905-695-2078

ASIA/PACIFIC

Asia Pacific Office
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon

Hong Kong
Tel: 852-2943-5100
Fax: 852-2401-3431

Australia - Sydney
Tel: 61-2-9868-6733
Fax: 61-2-9868-6755

China - Beijing
Tel: 86-10-8569-7000
Fax: 86-10-8528-2104

China - Chengdu
Tel: 86-28-8665-5511
Fax: 86-28-8665-7889

China - Chongqing
Tel: 86-23-8980-9588
Fax: 86-23-8980-9500

China - Dongguan
Tel: 86-769-8702-9880

China - Guangzhou
Tel: 86-20-8755-8029

China - Hangzhou
Tel: 86-571-8792-8115
Fax: 86-571-8792-8116

China - Hong Kong SAR
Tel: 852-2943-5100
Fax: 852-2401-3431

China - Nanjing
Tel: 86-25-8473-2460
Fax: 86-25-8473-2470

China - Qingdao
Tel: 86-532-8502-7355
Fax: 86-532-8502-7205

China - Shanghai
Tel: 86-21-3326-8000
Fax: 86-21-3326-8021

China - Shenyang
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

China - Shenzhen
Tel: 86-755-8864-2200
Fax: 86-755-8203-1760

China - Wuhan
Tel: 86-27-5980-5300
Fax: 86-27-5980-5118

China - Xian
Tel: 86-29-8833-7252
Fax: 86-29-8833-7256

ASIA/PACIFIC

China - Xiamen
Tel: 86-592-2388138
Fax: 86-592-2388130

China - Zhuhai
Tel: 86-756-3210040
Fax: 86-756-3210049

India - Bangalore
Tel: 91-80-3090-4444
Fax: 91-80-3090-4123

India - New Delhi
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

India - Pune
Tel: 91-20-3019-1500

Japan - Osaka
Tel: 81-6-6152-7160
Fax: 81-6-6152-9310

Japan - Tokyo
Tel: 81-3-6880-3770
Fax: 81-3-6880-3771

Korea - Daegu
Tel: 82-53-744-4301
Fax: 82-53-744-4302

Korea - Seoul
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

Malaysia - Kuala Lumpur
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

Malaysia - Penang
Tel: 60-4-227-8870
Fax: 60-4-227-4068

Philippines - Manila
Tel: 63-2-634-9065
Fax: 63-2-634-9069

Singapore
Tel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Hsin Chu
Tel: 886-3-5778-366
Fax: 886-3-5770-955

Taiwan - Kaohsiung
Tel: 886-7-213-7830

Taiwan - Taipei
Tel: 886-2-2508-8600
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

Finland - Espoo
Tel: 358-9-4520-820

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

France - Saint Cloud
Tel: 33-1-30-60-70-00

Germany - Garching
Tel: 49-8931-9700

Germany - Haan
Tel: 49-2129-3766400

Germany - Heilbronn
Tel: 49-7131-67-3636

Germany - Karlsruhe
Tel: 49-721-625370

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Germany - Rosenheim
Tel: 49-8031-354-560

Israel - Ra'anana
Tel: 972-9-744-7705

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Italy - Padova
Tel: 39-049-7625286

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Norway - Trondheim
Tel: 47-7289-7561

Poland - Warsaw
Tel: 48-22-3325737

Romania - Bucharest
Tel: 40-21-407-87-50

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

Sweden - Gothenberg
Tel: 46-31-704-60-40

Sweden - Stockholm
Tel: 46-8-5090-4654

UK - Wokingham
Tel: 44-118-921-5800
Fax: 44-118-921-5820

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Microchip:](#)

[ADM00760](#)



Стандарт Электрон Связь

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

Минимальные сроки поставки, гибкие цены, неограниченный ассортимент и индивидуальный подход к клиентам являются основой для выстраивания долгосрочного и эффективного сотрудничества с предприятиями радиоэлектронной промышленности, предприятиями ВПК и научно-исследовательскими институтами России.

С нами вы становитесь еще успешнее!

Наши контакты:

Телефон: +7 812 627 14 35

Электронная почта: sales@st-electron.ru

Адрес: 198099, Санкт-Петербург,
Промышленная ул, дом № 19, литера Н,
помещение 100-Н Офис 331